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Vince. The depression of the horizon, frequently noticed by persons residing near the sea, and some other phenomena of a similar nature, he thinks may likewise be ascribed to that single cause.

On a new fulminating Mercury. By Edward Howard, Esq. F.R.S.
Read March 13, 1800. [*Phil. Trans.* 1800, p. 204.]

We learn from the introduction to this paper, that mercury, and most, if not all, its oxides, may, by treatment with nitric acid and alcohol, be converted into a crystallized compound, possessing all the inflammable properties of gunpowder, as well as many others peculiar to itself. After stating the gradual steps by which he arrived at this discovery, Mr. Howard describes the following process and manipulations, which he found best calculated for producing this powder.

One hundred grains, or a greater proportional quantity, of quicksilver, are to be dissolved with heat in a measured ounce and a half of nitric acid. This solution being poured cold upon two measured ounces of alcohol, a moderate heat is to be applied, until an effervescence is excited. A white fume then begins to undulate on the surface of the liquor, and the powder will be gradually precipitated upon the cessation of action and re-action. This precipitate is to be immediately collected on a filter, well washed with distilled water, and carefully dried in a heat not much exceeding that of a water-bath. This immediate edulcoration of the powder is material, it being liable to the re-action of the nitric acid, which, while any of that acid adheres to it, renders it subject to the influence of light. The quantity of the powder produced varies according to the nature of the ingredients; 100 grains of quicksilver yielding from 120 to 132 grains of the compound.

The principal agents which decompose this mercurial powder are the nitric, the sulphuric, and the muriatic acids. The most remarkable effect is that of the sulphuric acid, which, when much concentrated, produces an explosion nearly at the instant of contact, on account, it is thought, of the sudden and copious disengagement of the caloric. When the acid is less concentrated, no explosion takes place; but a considerable discharge of gas, as well as caloric, is nevertheless effected; the former appearing to be a compound of carbonic acid and a peculiar inflammable gas, amounting in the whole to between 28 and 31 cubical inches. The inflammable gas was upon close examination found to be a nitrous ætherized gas, which appears to have been not the result of the decomposition, but, in fact, a constituent part of the powder.

Upon the whole of the investigation, Mr. Howard concludes that this mercurial powder is composed of nitrous ætherized gas, and of oxalate of mercury with excess of oxygen. Having stated his reasons for maintaining this opinion, he goes on to explain the theory of the combustion of the mercurial powder, on certain principles previously laid down in the investigation. The hydrogen, he says, of the oxalic acid and of the ætherized gas is first united to the oxygen of the

oxalate, forming water; the carbon is saturated with oxygen, forming carbonic acid gas; and a part, if not the whole of the nitrogen of the ætherized gas is separated in the state of nitrogen gas; both which gases are evidently produced after the decomposition of the powder. The mercury is now revived, and converted into vapour, as may be gathered from the immense quantity of caloric extricated, by adding concentrate sulphuric acid to the mercurial powder. On a more minute analysis he finds the proportion of these ingredients in 100 grains of the mercurial powder to be as follows:—

	<i>Grains.</i>
Of pure oxalic acid	21·28
Of mercury formerly united to the oxalic acid. . . .	60·72
Of mercury dissolved in the sulphuric liquor	2·00
Of mercury left in the sulphuric liquor after the separation of the gases	2·00
Total of mercury.	— 64·72
Of nitrous ætherized gas and excess of oxygen	14·00
	100·00

The following are the principal properties of this singular powder:—it takes fire at the temperature of 368° of Fahrenheit; it explodes by friction, by flint and steel, and by being thrown into concentrate sulphuric acid. It is equally inflammable under the exhausted receiver of an air-pump, as when surrounded by atmospheric air; and it detonates loudly, both by the blow of a hammer and a strong electrical shock. Its action, though extremely powerful, is however confined within a very limited sphere. It will burst a gun-barrel, though it will not carry a ball to any considerable distance.

Mr. Howard does not fail to caution future operators concerning the experiments they may be tempted to make on this powerful agent, having himself suffered considerably from an instantaneous explosion, produced by pouring six drams of concentrated sulphuric acid upon fifty grains of the powder, which wounded him severely, and destroyed the best part of his apparatus. This uncommon elastic power is ultimately ascribed to the gas and caloric suddenly set at liberty, and to the mercury and some portion of water being converted into vapour.

The paper concludes with some observations on other fulminating powders, where the author acknowledges that he has in vain attempted to communicate fulminating properties, by the *mercurial process*, to gold, platina, silver, antimony, tin, copper, iron, lead, zinc, nickel, bismuth, cobalt, arsenic, and manganese; mercury being as yet the only metal which he has found to have a joint affinity with nitrous ætherized gas and oxalic acid, or to be capable of combining with nitrous ætherized gas.